

## **THE USE OF CFD AT SYNCRUDE: SUCCESSES AND CHALLENGES**

**Larry HACKMAN**

Senior Research Associate, Syncrude Canada Ltd.,  
Edmonton Research Centre, 9421 - 17 Avenue, Edmonton, Alberta T6N 1H4, Canada

### **ABSTRACT**

Syncrude is located in northern Alberta Canada and produces 350,000 barrels of oil a day from the Athabasca oil sands deposit. This accounts for 15% of Canada's crude oil requirements. Since start-up in 1978, we have produced over 2 billion barrels of Syncrude Sweet Blend with another 8.3 billion barrels of recoverable oil in our remaining leases. Syncrude operates a combined mining, extraction and upgrading process with unique challenges that are presented by the harsh climate and difficulty of extracting oil from the deposits.

To improve our existing processes and increase reliability, CFD is becoming an important tool in the research department. Syncrude first started using CFD in the early 1980's to augment the information available from the more traditional approach of cold flow modelling. Initially all work was done by external consultants. By the 1990's, Syncrude added internal CFD capability to support the increased role of computer modelling in the research activities. In the last five years, there has been an exponential growth in the use of CFD for both research work as well as supporting ongoing operational issues.

Several examples of CFD projects over the last two decades will be presented to illustrate the successes we have had with CFD as well as some of the frustrations due to its limitations. Syncrude as well as other similar industries are moving more towards computer modelling with less reliance on physical experiments. There is a need for rapid improvements in the existing models to make this transition a success. To achieve continuous improvements in our processes in a competitive market, better understanding of the internal flow structures is required. This is difficult to accomplish with dimensionally scaled physical experiments and CFD is viewed as the preferred future direction.

For most industries, relying only on internal CFD capability is not feasible. Expertise in specialized fields of fluid dynamics is often required. A preferred approach is for government labs and research institutes to develop centers of excellence in a broad range of CFD. Access to these resources along with some level of in-house CFD capability is the most cost effective approach to using the capability of CFD in complex industrial processes.